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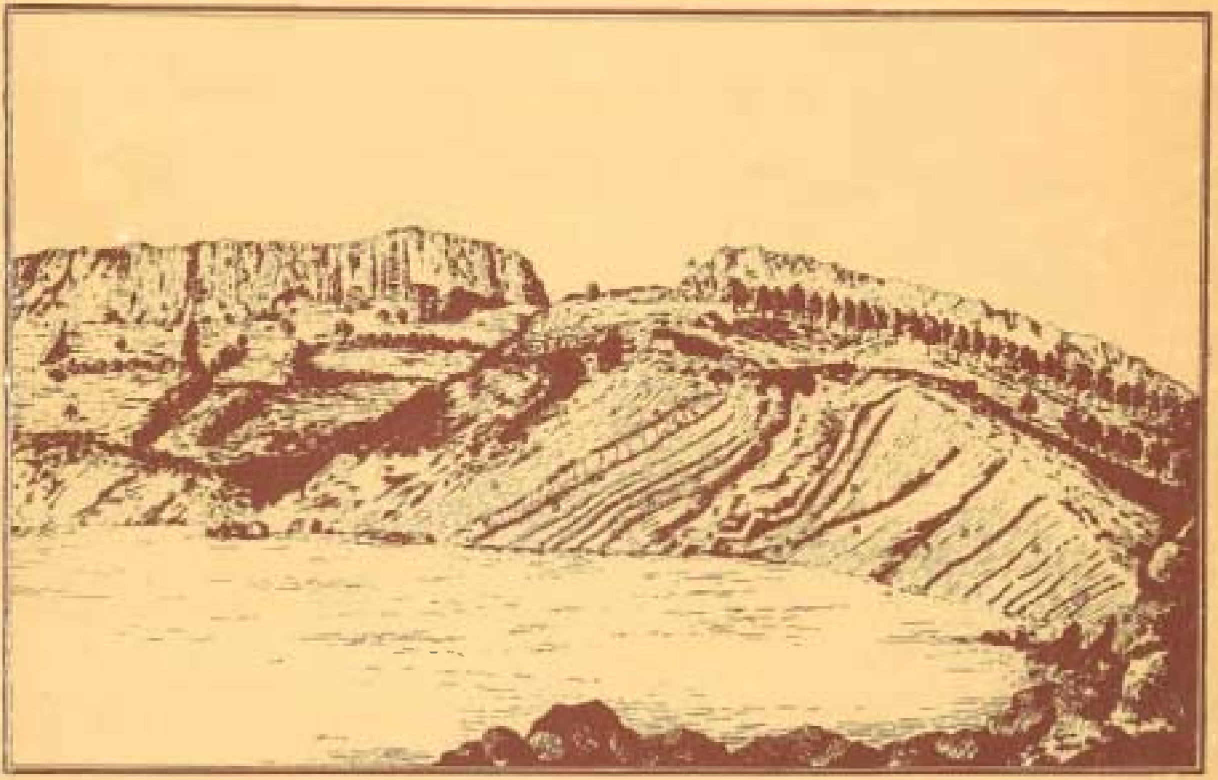
INTERNATIONAL ASSOCIATION OF SEDIMENTOLOGISTS

ABSTRACTS



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DIAGENETIC MODEL OF PERMO-TRIASSIC CONTINENTAL AND TRANSITIONAL SANDSTONES (RED BEDS) IN THE IBERIAN RANGE, SPAIN

J.A. DE LA PEÑA, J. ARRIBAS, Dpto. de Petrología, Universidad Complutense, Madrid (3)
B. DE LA CRUZ, Junta de Energía Nuclear, División de Materiales, Madrid (3)
R. MARFIL, Dpto. de Petrología, Universidad Complutense, Madrid (3)

DEPOSITIONAL ENVIRONMENT, GEOLOGICAL HISTORY AND TECHNIQUES

The Permian-Triassic sedimentation throughout the Iberian Range is related to the first phases of formation of an aulacogen (pre-graben and graben phases) according to CAPOTE (1982). The first deposits correspond principally to acid and medium acid vulcanites, which progressively change to fluvial and lacustrine volcaniclastic sediments, predominantly of black and gray colours (Autunian facies). Afterwards, a detrital sedimentation without volcanic influence takes place in fluvial-lacustrine environments composed of breccias, sandstones and red siltstones (Saxonian facies). From this moment onwards, the sedimentation belonging to the graben phase begins. The deposits are part of a detrital thinning-upwards red megasequence constituted by conglomerates, sandstones and siltstones of fluvial environment which gradually changes to tidal influence toward the top (Buntsandstein facies). The Triassic sedimentation ends with carbonate-evaporitic deposits (Muschelkalk and Keuper facies).
The aim of this paper is to draw attention to those diagenetic processes on materials belonging to the Saxonian and Buntsandstein facies, considered as red beds. The diagenetic evolution of the Autunian volcaniclastic facies has been already studied (DE LA PEÑA & MARFIL, 1980; MARFIL et al., 1981).
The results are based on study of 14 stratigraphic sections and 6 cores, which correspond to more than 850 samples. The techniques used were the following: Microscopic petrography, X-ray analyses of interbedded siltstones, SEM, cathodoluminiscence and porosity-permeability measures.

GENERAL PETROGRAPHY

The sandstones were plotted in a Q-F-LRF triangular diagram. An evident evolution from the Saxonian facies at the bottom (fundamentally quartzarenites and sublitoarenites) to the Buntsandstein facies at the top (subarkoses and arkoses) is observed.
The composition of the Saxonian facies varies locally due to the isolation of the basins which received materials from very local source areas (fundamentally low grade metamorphic rocks). On the other hand, the unification of the basins during the Buntsandstein allows a gradual evolution from subarkoses to arkoses towards the top with dominant granitic-gneissic source areas (LUCAS et al., 1977; ARRIBAS et al., 1980).

MAJOR DIAGENETIC EVENTS

The **mechanical compaction** is more important in the arkoses-subarkoses due to the high proportion of micas (up to 17%) and the presence of labile rock fragments (micaceous schists and mud pebbles). As a result of this compaction, the importance of the pseudomatrix is emphasized, originating a framework collapse (NAGTEGAAL, 1980) during the earliest stages of diagenesis.

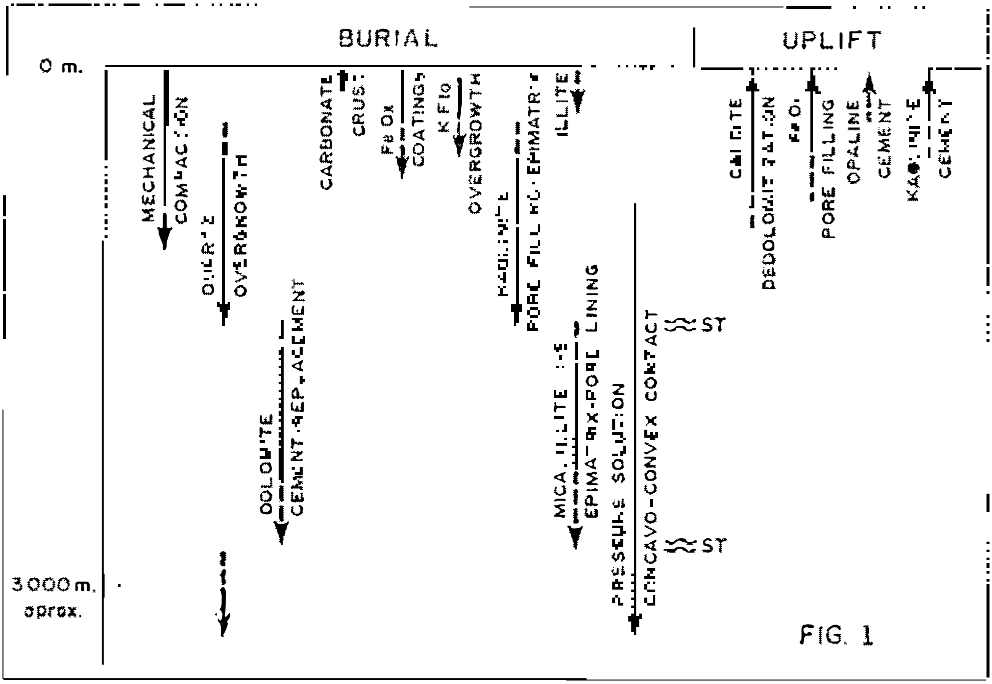
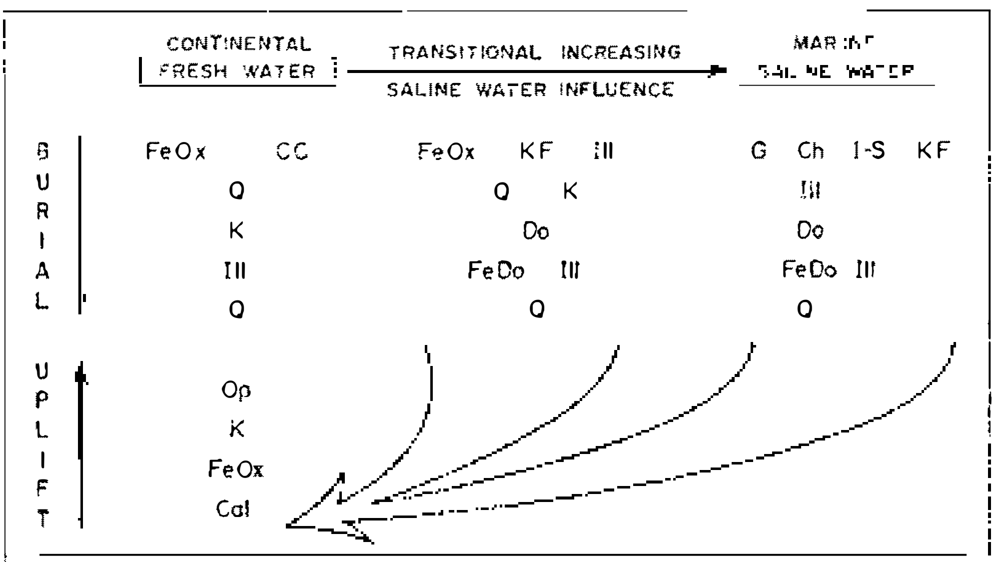


FIG. 1



FeOx: Ferric Oxide
CC: Carbonate crust
KF: Potassium feldspar
Ill: Illite
G: Gypsum
Ch: Chlorite
I-S: Mixed-layer illite-smectite
K: Kaolinite
Do: Dolomite
FeDo: Ferroan dolomite
Op: Opal
Cal: Calcite
Q: Quartz

FIG. 2

The mineralogical types of **cements and/or replacements** are: (1) **Quartz** (as overgrowth) with a very extensive temporal and spatial distribution; (2) **Dolomite**, more or less ferroan, whose content generally increases towards the top of the Buntsandstein; (3) **Fe-oxide**, dominant in the Saxonian facies; (4) **K-Feldspar**, frequent in the top of the Buntsandstein; (5) **Phyllosilicates:** Kaolinite-dickite pore fillings are found in the Buntsandstein, being more abundant in the basal coarser-grained sandstones. Illite-mica pore lining and illite-smectite mixed-layer appear irregulary distributed. The replacement of K-Feldspars by illite and/or kaolinite (epimatrix) which are relatively abundant in the Buntsandstein are included in this type of cement. The presence of phyllosilicatic cements, epimatrix and pseudomatrix, contributes to the graywackization of these sandstones. (6) Other local cements are barite, gypsum, pitchblende and uranium secondary minerals (mostly uranile phosphates).
The **chemical compaction** precesses are moderate, the concave-convex eontact being dominant type. Nevertheless, strongly suturated contacts exist in levels rich in mica and organic matter. This contact is very important in the Buntsandstein due to the high mica contents and the frequent levels with dispersed organic matter.

DIAGENETIC EVOLUTION

In Fig. 1. the burial history of Saxonian and Buntsandstein facies has been represented. In Fig. 2, the order of occurrence of the different authigenic minerals has been represented in relation to the salinity of the interstitial waters and their depositional environments.